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Original Article

Dentistry Section

Evaluation of First, Second and Third Generation Probe after Phase I Therapy in Chronic Periodontitis Patients- A Randomised Clinical Study

SA JACOB RAJA[1], JOHNSON RAJA JAMES[2], TAMIL SELVAN KUMAR[3], JP MOHAN RAJ[4], S DIVYA[5], P FAIRLIN[6], GOKULVATHI RAJKUMAR[7], MARIA BEULAH[8]

ABSTRACT

Introduction: Periodontitis manifested by the presence of periodontal pocket depth and loss of attachment level is detected and measured by using periodontal probes. Various generations of probes have been discovered and are used to measure the pocket depth. There has been a huge difference in the accuracy of different generations of probe.

Aim: To compare the interprobe accuracy of first, second and third generations of probe on clinical parameters in patients with chronic periodontitis.

Materials and Methods: This randomised comparative clinical study was conducted at the Department of Periodontics, Bapuji Dental College and Hospital, Davangere, Karnataka, India and included 30 chronic periodontitis patients, randomly allocated into three groups with each group consisting of 10 patients. The study was conducted over a period of eight months, from February 2001 to October 2001. Conventional periodontal probe, True Pressure Sensitive (TPS) probe and Florida probe were used to examine the patients. The probes were used in sequence of I, II and III for first 10 patients, II, III and I for next 10 patients and III, I and II for the last 10 patients to avoid bias due to examiner memory of clinical parameters. The recorded clinical parameters were Plaque Index (PI) (Silness and Loe 1964), Gingival Index (GI) (Loe and Silness 1963), Bleeding On Probing (BOP) index (Ainamo and Bay 1975), Probing Pocket Depth (PPD) and Clinical Attachment Level (CAL). At baseline, all the clinical parameters were recorded by two calibrated examiners i.e., Examiner-1 and Examiner-2. Examiner-I recorded all the clinical parameters postoperatively at Ist, IInd, IIIrd and IVth consecutive weeks. The statistical analysis was done using paired t-test, One-way Analysis of Variance (ANOVA), studentised range test and Karl Pearson's correlation coefficient test for calculation and comparison of interexaminer and intraexaminer variability.

Results: Among the 30 patients included in the present study, 22 were males and eight were females. The mean age of the patients involved in the study was 45.16±1.33 years. The mean value of PI and GI showed a statistically significant reduction at different intervals with a value of 0.16±0.21 and 0.22±0.21 postoperatively (4th week). The probing depths measured using Williams periodontal probe, TPS probe and Florida probe were reduced to 4.2±0.4 mm, 3.9±0.4 mm and 3.5±0.4 mm, respectively at the end of 4th week. The CAL measured using Williams periodontal probe, TPS probe and Florida probe were reduced to 7.0±0.6 mm, 6.6±0.5 mm and 6.1±0.6 mm, respectively at the end of 4th week.

Conclusion: The TPS probe, Williams probe, and Florida probe showed their superiority regarding the accuracy of recording clinical parameters in the decreasing order respectively.

Keywords: Clinical attachment level, Florida probe, Probing pocket depth, True pressure sensitive probe, Williams periodontal probe

INTRODUCTION

Periodontitis being the most common chronic disease affecting the human beings results not only in the early loss of teeth but also can lead to various systemic conditions like Coronary artery disease, Sub Acute Bacterial Endocarditis (SABE) and low birth weight babies. Therefore, detecting the periodontitis in early stage is very critical for successful treatment [1]. Periodontal pocket and CAL are considered as the main cardinal signs of periodontitis. Therefore, their accurate and early identification is of fundamental significance in diagnosis, prognosis and treatment planning of periodontitis [2]. Inspite of the many diagnostic methods available to detect periodontitis, such as intraoral radiographs, study casts, clinical photographs, assessment of Gingival Crevicular Fluid (GCF) flow, microbiological and immunological assays, still the clinical examination stands to be the one of the most useful diagnostic tool to determine the presence and severity of the periodontal lesion [3].

Measuring the periodontal pockets using periodontal probe has long been accepted as the gold standard method. Periodontal probes have also been used for other purposes, such as to detect and quantify the dental plaque, gingival inflammation, levels of alveolar crest, loss of attachment, width of attached gingiva, furcation involvement, mobility and gingival recession detection [4]. The disparity in the measurements by periodontal probe may be associated with the probing technique, size of the probe tip, Precision of probe caliberation, angulation of insertion, irregularities in root configuration, presence of calculus and inflammation and the pain provoked by probing etc [5].

Philstrom BL classified the probes into first generation probes {conventional probes for manual probing (e.g., Williams Periodontal probe, Marquis colour coded probes, Michigan 'O' Pobe)}, second generation probes {Pressure sensitive probe for applying constant force (e.g., TPS probe, Yeaple probe and Prodentac probe)} and third generation probes {Computer assisted probes (e.g., Florida probe, Foster miller probe and Toronto probe} [4]. Watts et al., in 2000 added fourth and fifth generations to the periodontal probe classification system. To date, the periodontal probe developed by William CHM (1936) has been one of the most popular and reliable methods for periodontal examination [6]. However, its use in its

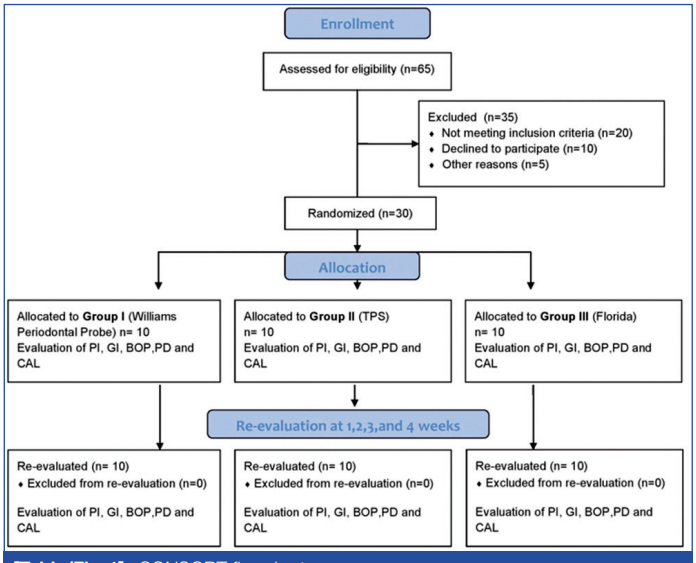
classic conception presents many problems in terms of sensitivity and reproducibility of results. Probing force has been considered as one of the most crucial factor in determining the reproducibility of the results, since the probing force is directly related to the penetration of the probe [5]. The second generation pressure regulated (viva care TPS) manual plastic probe claims to have better tactile sensation and accurate assessment having a constant probing force of 20 grams [7]. The third generation probes (Florida Probe system) combines the advantages of constant probing force of 20 grams with precise electronic measurement and computer storage of the data [8].

Till date, limited studies alone are available comparing the accuracy and reproducibility of the three generation of probes on clinical parameters before and after phase I therapy [9,10]. The present study aimed at comparing the intraexaminer reproducibility, interexaminer reliability, intra and inter probe accuracy in recording the clinical parameters at different intervals using a conventional Williams periodontal probe, TPS probe and Florida probe.

MATERIALS AND METHODS

This is a randomised comparative clinical study in which a total of 30 patients between the age group of 35-60 years were recruited from the Out-Patient Department (OPD) in Department of Periodontics, Bapuji Dental College and Hospital, Davangere, Karnataka, India. The study was conducted over a period of eight months from February 2001 to October 2001. Ethical clearance was obtained from the institutional ethical committee (BDCH/021/01/01). Written consent was obtained from the selected patients for participation after explaining the nature of the study.

Sample size calculation: The sample size was determined using nMaster 2.0 sample size software based on hypothesis testing means obtained from previous study [11]. The minimum sample size obtained was 10 per group with equal all allocation. Patients were allocated into three groups by lottery method as shown in Consolidated Standards of Reporting Trials (CONSORT) flowchart [Table/Fig-1].



[Table/Fig-1]: CONSORT flowchart.

Inclusion criteria: Chronic periodontitis patients having a probing depth of more than 3 mm in atleast six teeth (Periodontal pocket); patients with no history of periodontal treatment in the last six months and systemically healthy patients, were included in the study.

Exclusion criteria: Patients having history of systemic diseases; smokers and alcoholics; third molars because of inaccessibility in those areas (difficult in reaching those areas, limited mouth opening); patients who were on antibiotics or antibacterial mouthwashes, were excluded from the study.

Study Procedure

Based on the inclusion and exclusion criteria, out of 45 patients enrolled in the study, 30 patients were selected. A customised occlusal acrylic stents was fabricated for the selected teeth for each patient to standardise the angle of insertion for different generation of probes. Six surfaces (distobuccal, mid-buccal, mesiobuccal, distolingual, midlingual and mesiolingual) of three index teeth i.e., one incisor, one premolar and one molar in each arch were selected for evaluation.

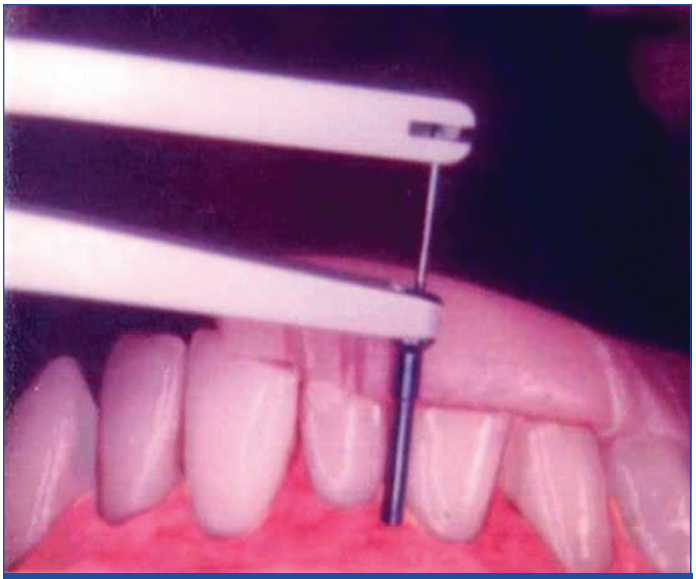
Assessment of clinical parameters: The prepared stents were placed on the selected teeth. Vertical grooves were used to standardise the direction and the position of the probe during insertion. Three probes which includes Williams Periodontal probe, TPS probe and Florida probe were inserted parallel to the long axis of the selected tooth surfaces till the soft tissues or Cemento-enamel Junction (CEJ) was felt as shown in [Table/Fig-2,3]. The probes were used in sequence of I, II and III for first 10 patients, II, III and I for next 10 patients and III, I and II for the last 10 patients, to avoid bias due to examiner memory (Mayfield L et al., 1996) [9].

The clinical parameters were recorded at baseline, immediately after scaling and root planing, Ist, IInd, IIIrd and at IVth consecutive weeks. The recorded clinical parameters were PI (Silness and Loe 1964), GI (Loe and Silness 1963), BOP index (Ainamo and Bay 1975), PPD and CAL [12-14].

At baseline, all the clinical parameters were recorded by two calibrated examiners i.e., Examiner-1 and Examiner-2 as shown in [Table/Fig-2-4]. Initially, Examiner-1 recorded the clinical parameters twice consecutively, with an interval of 15 minutes. After 45 minutes Examiner-2 recorded the clinical parameter once. Even though

[Table/Fig-2]: Probing Pocket Depth (PPD) measured using Williams periodontal probe.

[Table/Fig-3]: Probing Pocket Depth (PPD) measured using TPS probe.



[Table/Fig-4]: Probing Pocket Depth (PPD) measured using Florida probe.

recording the parameters twice by the examiners for each patient was cumbersome, the recordings were taken for more accuracy of the study after getting consent from the patient. Baseline examination was followed with a thorough ultrasonic scaling and root planing. Clinical parameters following Scaling and Root Planing (SRP) were recorded by Examiner-1. Examiner-1 recorded all the clinical parameters postoperatively at Ist, IInd, IIIrd and IVth consecutive weeks. At each recall visit, oral hygiene instructions were reinforced and the selected teeth were deplaqued, if required, but no subgingival instrumentations were performed.

STATISTICAL ANALYSIS

The statistical analysis was done using paired t-test, one-way ANOVA and Karl Pearson's correlation coefficient test for calculation and comparison of interexaminer and intraexaminer variability. Statistical significance was set at 5%. Statistical tests were done using Statistical Package for the Social Sciences (SPSS) software, version 14.0.

RESULTS

Thirty patients within the age group of 35-60 years were randomly divided into 3 groups with 10 patients each. Among the 30 patients included in the present study, 22 were males and eight were females. The mean age of the patients involved in the study was 45.16±1.33 years.

I. Plaque Index (PI) [12]: The mean PI at baseline was 2.11±0.43 and was reduced to 0.0, 1.38±0.32, 0.83±0.34, 0.34±0.28 and 0.16±0.21 at immediate postoperative, first, second, third and fourth consecutive weeks respectively as shown in [Table/Fig-5,6]. There was 92.5% reduction in the plaque score at fourth week and it was statistically significant, when compared to the baseline value (p<0.01).

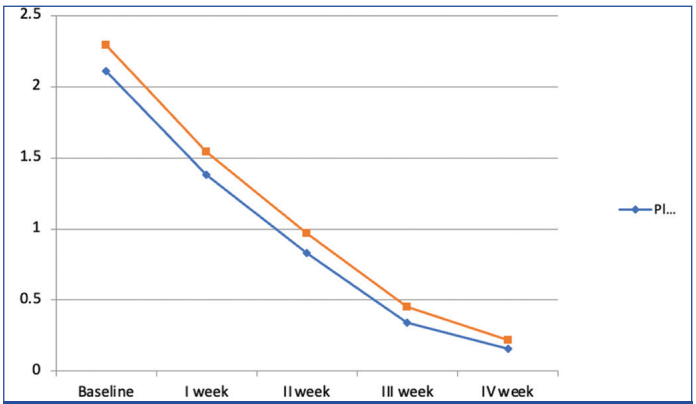
II. Gingival Index (GI) [12]: The mean GI at baseline was 2.29±0.35 and was found to be 2.29±0.35, 1.54±0.38, 0.97±0.32, 0.45±0.29 and 0.22±0.21 at immediate postoperative, first, second, third and fourth consecutive weeks respectively as shown in [Table/Fig-5,6]. There was 90.4% reduction in the gingival score at fourth week and it was statistically significant, when compared to the baseline value (p<0.01).

III. Gingival Bleeding Index [12]: Comparison of the interprobe accuracy for BOP at different intervals [Table/Fig-7,8]: At baseline there was no difference in BOP levels between Ist, IInd and IIIrd generation probe with a p-value=1.00. At Ist week BOP value measured using Williams periodontal probe, TPS probe and Florida probe were 0.97±0.05, 0.94±0.09 and 0.91±0.09, respectively. The difference was statistically significant (p<0.01). The value at IVth week showed statistically significant difference between Williams periodontal probe and Florida probe and also between TPS probe and Florida probe with a p-value <0.01. Intraexaminer reproducibility interexaminer reliability was 100% for all three generation of probes [Table/Fig-9].

IV. Probing Pocket Depth (PPD): Comparison of the interprobe accuracy for PPD levels at different intervals [Table/Fig-7,10]:

Interval	Plaque Index (PI)			Gingival Index (GI)		
	Mean±sd	Percentage reduction from baseline	p-value	Mean±sd	Percentage reduction from baseline	p-value
Baseline	2.11±43			2.29±0.35		
I week	1.38±0.32	34.6	<0.01	1.54±0.38	32.8	<0.01*
II week	0.83±0.34	60.7	<0.01	0.97±0.32	57.6	<0.01*
III week	0.34±0.28	83.9	<0.01	0.45±0.29	80.3	<0.01*
IV week	0.16±0.21	92.5	<0.01	0.22±0.21	90.4	<0.01*

[Table/Fig-5]: Mean Plaque Index (PI) and Gingival Index (GI) at different intervals.
*Significant
p<0.05=Statistically Significant
p-value based on paired t-test

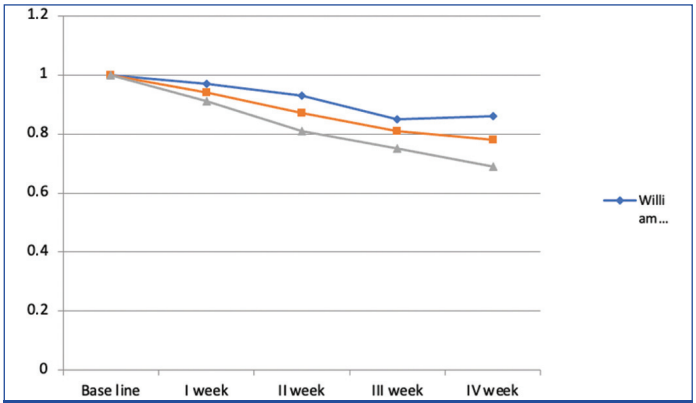


[Table/Fig-6]: Mean Plaque Index (PI) and Gingival Index (GI) at different intervals.

Interval	Williams probe (I)		True Pressure Sensitive probe (TPS) (II)		Florida probe (III)		Difference between probes (Mean difference) (mm)			F-value p-value
	Mean±SD	% reduction	Mean±SD	% reduction	Mean±SD	% reduction	I-II in mm	I-III in mm	II-III in mm	
Bleeding Index										
Baseline	1.00±0.0		1.00±0.0		1.00±0.0					F=5.35 p=1.000
I week	0.97±0.05	3	0.94±0.09	6	0.91±0.09	9	0.03	0.06	0.03	F=13.7 p<0.01
II week	0.93±0.08	7	0.87±0.10	13	0.81±0.07	19	0.06	0.12	0.06	F=4.5 p<0.05
III week	0.85±0.17	15	0.81±0.11	19	0.75±0.09	25	0.04	0.10	0.06	F=18.8 p<0.01
IV week	0.86±0.11	14	0.78±0.11	22	0.69±0.12	31	0.10	0.17	0.09	F=5.35 p<0.01
Significance from baseline	F=91.9 p<0.01 Significant		F=91.9 p<0.01 Significant		F=91.9 p<0.01 Significant					

Probing Pocket Depth (PPD) (in mm)										
Baseline	4.5±0.5		4.1±0.5		3.9±0.5		0.4	0.6	0.2	F=8.78 p<0.01
I week	4.8±0.5	-6.7	4.4±0.5	-7.3	4.3±0.4	-10.3	0.4	0.5	0.1	F=8.77 p<0.01
II week	4.7±0.4	-4.4	4.3±0.4	-4.9	4.0±0.6	-2.6	0.4	0.7	0.3	F=14.4 p<0.01
III week	4.5±0.4	-	4.1±0.5	-	3.8±0.4	2.6	0.4	0.7	0.3	F=18.0 p<0.01
IV week	4.2±0.4	6.7	3.9±0.4	4.9	3.5±0.4	10.3	0.3	0.7	0.4	F=24.2 p<0.01
Significance from baseline	F=11.7 p<0.01 Significant		F=8.43 p<0.01 Significant		F=25.0 p<0.01 Significant					
Clinical Attachment Level (CAL) (in mm)										
Baseline	7.4±0.7		6.9±1.0		6.8±0.7		0.5	0.6	0.1	F=5.29 p<0.01
I week	7.8±0.7	-5.4	7.3±0.7	-10.1	7.0±1.2	-2.9	0.5	0.8	0.3	F=6.24 p<0.01
II week	7.5±1.4	-1.4	7.1±1.3	-2.9	6.9±0.9	-1.5	0.4	0.6	0.2	F=1.47 NS
III week	7.2±0.9	2.7	7.0±0.6	-1.4	6.5±0.7	4.4	0.2	0.7	0.5	F=6.04 p<0.01
IV week	7.0±0.6	5.4	6.6±0.5	4.3	6.1±0.6	10.3	0.4	0.9	0.5	F=17.93 p<0.01
Significance from baseline	F=4.18 p<0.01 Significant		F=3.87 p<0.01 Significant		F=8.78 p<0.01 Significant					

[Table/Fig-7]: Comparison of Intra and Inter probe accuracy of mean bleeding index, PPD and CAL assessed by Williams probe, TPS probe and Florida probe at different intervals.
Mean±SD values presented in mm; *Statistically Significant
p<0.05- Statistically Significant
p-value based on one-way ANOVA; SD: Standard deviation



[Table/Fig-8]: Comparison of mean bleeding index assessed by Williams probe, TPS probe and Florida probe at different intervals.

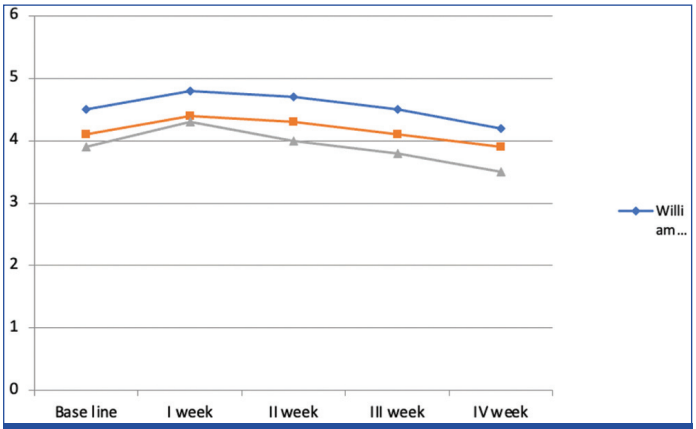
At baseline the difference in PPD levels between Ist, IInd and between Ist, IIIrd generation probe were statistically significant. (p<0.01) The difference between IInd and IIIrd generation probes were statistically not significant. The value at IVth week showed statistically significant difference between Williams periodontal probe and Florida probe, Florida probe and TPS probe and also between TPS probe and Florida probe with a p-value of <0.01. The intraexaminer reproducibility was 100% for TPS probe and 97% for both Williams periodontal probe and Florida probe. Similarly the interexaminer reliability was 97% for TPS probe and 93% for both Williams periodontal probe and Florida probe [Table/Fig-9].

V. Clinical Attachment Level (CAL): Comparison of the interprobe accuracy for Clinical Attachment Level (CAL) values at different intervals [Table/Fig-7,11]: At baseline the difference in CAL values between three types of probes were statistically

Intraexaminer reproducibility and Interexaminer reliability for Bleeding Index.											
Florida Probe (III)				TPS (II)				Williams Probe (I)			
Intraexaminer (Replicate)		Interexaminer		Intraexaminer (Replicate)		Interexaminer		Intraexaminer (Replicate)		Interexaminer	
R_1	1.0	R_1	1.0	R_1	1.0	R_1	1.0	R_1	1.0	R_1	1.0
R_2	1.0	R_{II}	1.0	R_2	1.0	R_{II}	1.0	R_2	1.0	R_{II}	1.0
Diff	0.0		0.0	Diff	0.0		0.0	Diff	0.0		0.0
r-value	1.0		1.0		1.0		1.0		1.0		1.0
Sites showing <0.5 BI Diff	100%		100%		100%		100%		100%		100%
Intraexaminer reproducibility and Interexaminer reliability for Probing Depth											
R_1	3.97±0.53	R_1	3.93±0.52	R_1	4.06±0.52	R_1	4.07±0.53	R_1	4.46±0.53	R_1	4.47±0.51
R_2	3.93±0.52	R_{II}	4.05±0.51	R_2	4.07±0.53	R_{II}	4.15±0.53	R_2	4.47±0.51	R_{II}	4.53±0.60
Diff	0.04	Diff	-0.12±0.34	Diff	0.01	Diff	0.08	Diff	-0.01	Diff	-0.06
F*	0.10	t**	1.93	F*	0.004	t*	0.60	F*	0.01	t*	0.44
P	0.76 NS	P	0.10 NS	P	0.95 NS	P	0.55 NS	P	0.93 NS	P	0.92 NS
r-value	0.97		0.84	r-value	0.92		0.83	r-value	0.96		0.84
Sites showing <0.5 PD Diff	97%		93%		100%		97%		97%		93%

Intraexaminer reproducibility and Interexaminer reliability for Clinical Attachment Level (CAL)											
R_1	6.86±0.86	R_1	6.77±0.73	R_1	7.07±0.79	R_1	6.92±1.01	R_1	7.48±0.75	R_1	7.44±0.74
R_2	6.77±0.73	R_{II}	6.85±0.79	R_2	6.92±1.01	R_{II}	7.06±0.75	R_2	7.44±0.74	R_{II}	7.47±0.75
Diff	0.09±0.43	Diff	-0.08±0.50	Diff	0.15±0.62	Diff	-0.14±0.43	Diff	0.04±0.32	Diff	-0.03±0.30
F*	0.17	t**	0.85	F*	0.42	t*	1.22	F*	0.03	t*	0.5
P	0.68 NS	P	0.40 NS	P	0.52 NS	P	0.23 NS	P	0.86 NS	P	0.61 NS
r-value	0.87		0.79	r-value	0.79		0.80	r-value	0.91		0.92
Sites showing <0.5 PD Diff	83%		83%		93%		93%		93%		93%

[Table/Fig-9]: Intraexaminer reproducibility and interexaminer reliability for Williams probe, TPS probe and Florida Probe.
R_1 and R_2: Repeated measurements (Same Examiner-1)
R_1: Examiner-2
*One-way ANOVA F-test
**Paired t-test
r-Pearson's correlation co-efficient

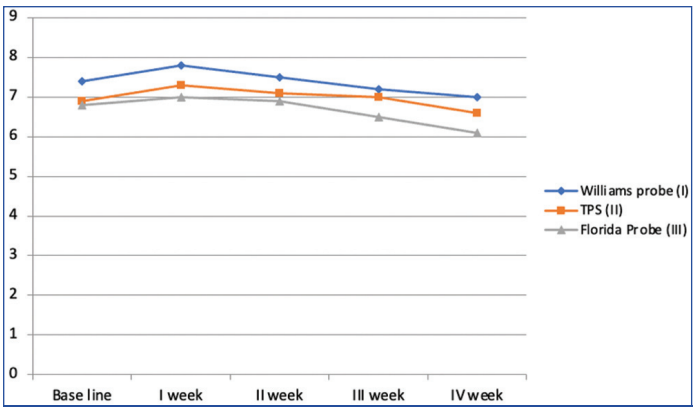


[Table/Fig-10]: Comparison of mean Probing Pocket Depth (PPD) assessed by Williams probe, TPS probe and Florida probe at different intervals.

significant (p<0.01). The value at IV[th] week showed statistically significant difference between Williams periodontal probe and Florida probe and also between TPS probe and Florida probe with a p-value <0.01. The intraexaminer reproducibility was 83% for Florida probe and 97% for both Williams periodontal probe and TPS probe. Similarly, the interexaminer reliability was 83% for Florida probe and 97% for both Williams periodontal probe and TPS probe [Table/Fig-9]. Williams periodontal probe and TPS probe were better based on the interexaminer reliability and intraexaminer reproducibility for all clinical parameters measured. When compared to Williams probe, TPS probe showed increased reliability and reproducibility [Table/Fig-9].

DISCUSSION

The mean difference of PI showed a statistically significant reduction at different intervals similar to the findings of Lang NP et al., who found an incremental improvement in plaque control throughout the study period [15]. GI reflects the severity of the gingivitis, thereby helps in planning the treatment course. The mean difference of GI showed a statistically significant reduction at different intervals similar to the findings of Heft WM et al., who found an incremental improvement in gingival health throughout the study period which might be due to the thoroughness of treatment and reinforced Oral Hygiene Index (OHI) at short recall intervals that might have resulted in plaque reduction and gingival health [16].



[Table/Fig-11]: Comparison of mean Clinical Attachment Level (CAL) assessed by Williams probe, TPS probe and Florida probe at different intervals.

Bleeding tendency has been suggested to be a very critical diagnostic criterion in evaluating the periodontal health or disease. The mean difference between the three generations of probe at regular intervals was statistically significant as shown in [Table/Fig-7]. The variable result obtained for gingival bleeding index by different probes at different intervals may be due to lack of pressure control in manual probe as reported by Lang NP et al., and because of the persistence of inflammation even after the treatment with pressure sensitive probes as suggested by Vander VU (1980) [15,17]. Similary, Tripathi P et al., in a research have mentioned that the amount of pressure applied during the probing influence the bleeding and found more bleeding sites in the area probed with conventional periodontal probing [18]. In accordance with the findings of the above study, the intra and interexaminer reproducibility and reliability of gingival bleeding index for all the three probes were excellent (Cronbach's alpha=0.85).

Probing depth has been a key measurement to monitor the disease severity before and after treatment. At baseline the mean difference between Florida and Williams periodontal probe, TPS and Williams probe were statistically significant (p<0.01) similar to the findings of Perry DA et al., who found conventional probing to be more reliable than II[nd] and III[rd] generation probes [11], which was in contrary to the findings of Breen HJ et al., who found linear correlation between the probes [8]. The difference between Florida and TPS probes was statistically not significant which was in accordance to the findings of Breen HJ et al., and in contradictory to the findings of Perry DA et al., [11].

Similarly a study done by Barendregt DS et al., have showed that second generation probe showed lower pocket depth measurements when compared to first generation probes [19]. Sethna GD et al., have mentioned in a research that the variable results obtained for probing depth by different probes at different intervals may be due to inherent difficulties with the use of landmarks, size and shape of the probe tips that impede positioning interproximally or in areas of poor access and lack of tactility in II[nd] and III[rd] generation probes that may complicate reproducibility between them and also with I[st] generation probe. Supporting the finding of the current study, the study done by Sethna GD et al., also showed that pocket depth measurement by using conventional probing was significantly higher when compared to the second and third generation probing [20].

S. No.	Authors name and year	Place of study	Number of subjects	Mean age	Comparison	Conclusions
1	Tripati P et al., (2021) [18]	Uttar Pradesh	50 Subjects	-	Bleeding On Probing (BOP) was detected by using conventional probe and a manual pressure sensitive probe	More bleeding sites were found in the quadrant associated with the conventional probe as compared to the sites associated with pressure sensitive probe
2	Barendregt DS et al., (2006) [19]	Netherland	12 patients	-	Florida probe, Jonker probe, Brodontic probe and Manual probe	Brodontic and manual probe appear to be reliable tools for reproducible pocket depth measurements
3	Sethna GD et al., (2016) [20]	Mumbai	30 subjects	25-60 years	UNC 15, PDT Pressure sensitive probe and the Floida probe PD and CAL was measured and compared.	Florida probe showed more accuracy in measuring CAL
4	Bareja H et al., (2021) [22]	Uttar Padesh	30 patients	-	Accuracy of conventional periodontal probing and CEJ handpiece of electronic periodontal probing	EP is advantageous for research purposes by providing automatic recording and long-term maintenance of data storage
5.	Present study	Karnataka	30 patients	35-60 years	PI, GI, BOP, PPD and CAL assessed by Williams periodontal probe, TPS probe and Florida probe.	The Florida probe, Williams probe and TPS probe showed their superiority regarding the accuracy of recording clinical parameters in the increasing order, respectively.

[Table/Fig-12]: Studies comparing different generations of probe [18-20,22].

The relatively resilient gingival margin and the lack of clear demarcation with subgingival location of CEJ, causes inherent difficulties which was supported by Badersten A et al., who found that use of occlusal stents improved reproducibility of CAL measurements when compared to CEJ as reference [5]. However in the present study, the difference between the three generations of probe was not significant in detecting the CAL. This was in contrast to the study done by Bareja H et al., have showed that application of CEJ handpiece of electronic probe in the detection of attachment level was more advantageous, when compared to conventional probing [21]. Previously, studies have been done comparing either the first and second generation probes or first, second and third generation probes as shown in [Table/Fig-12] [18-20,22]. The current study compared all the three generations of probing system for their reproducibility and reliability and found that, Williams probe and TPS probe showed more accuracy based on their reproducibility and reliability. When compared to Williams probe, TPS probe showed increased reliability and reproducibility.

Limitation(s)

Limitations of the present study are inclusion of fewer number of patients in the study, failure to include the fourth and fifth generation probing systems, repeated probing by the examiners on the same patients twice. Therefore, it is highly imperative that, considering the above mentioned factors a further long term multi-centered, multi-calibrated examiner studies, incorporating the fourth and fifth generation probes are needed.

CONCLUSION(S)

The Florida probe, Williams probe and TPS probe showed their superiority regarding the accuracy of recording clinical parameters in the increasing order respectively based on the interexaminer reliability and intraexaminer reproducibility. But TPS and Florida probe required more time and caused discomfort, when compared to Williams probe. This suggests the use and interpretation of these readily available diagnostic modalities requires a clear understanding of their respective limitations and capabilities. The similar results obtained for the reproducibility and reliability between the examiners may be attributed to the experience of the calibrated examiners.

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PARTICULARS OF CONTRIBUTORS:
1. Chairman, Department of Periodontics, Rajas Dental College and Hospital, Tirunelveli, Tamil Nadu, India.
2. Head, Department of Periodontics, Rajas Dental College and Hospital, Tirunelveli, Tamil Nadu, India.
3. Senior Lecturer, Department of Periodontics, Rajas Dental College and Hospital, Tirupur, Tamil Nadu, India.
4. Reader, Department of Periodontics, Rajas Dental College and Hospital, Tirunelveli, Tamil Nadu, India.
5. Reader, Department of Periodontics, Rajas Dental College and Hospital, Tirunelveli, Tamil Nadu, India.
6. Senior Lecturer, Department of Periodontics, Rajas Dental College and Hospital, Tirunelveli, Tamil Nadu, India.
7. Postgraduate, Department of Periodontics, Rajas Dental College and Hospital, Tirunelveli, Tamil Nadu, India.
8. Postgraduate, Department of Periodontics, Rajas Dental College and Hospital, Tirunelveli, Tamil Nadu, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. SA Jacob Raja,
Chairman, Department of Periodontics, Rajas Dental College and Hospital,
Kavalkinaru-627105, Tirunelveli, Tamil Nadu, India.
E-mail: antomadona92@gmail.com

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